

Appl. No. 09/810,871
Amdt. dated February 8, 2006
Reply to Office Action of February 3, 2005

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

Claims 1-35 (Canceled)

Claim 36 (Currently amended): A test apparatus for testing an electronic device, said test apparatus comprising:

a flexible contactor comprising first and second opposing surfaces and a first plurality of terminals disposed on said first surface; and

an interposer comprising:

a substrate,

a first plurality of elongate, resilient contact elements extending from a first side of said substrate, ones of said first plurality of contact elements corresponding to ones of said first plurality of terminals, and

a second plurality of elongate, resilient contact elements extending from a second side of said substrate, ones of said first plurality of contact elements being electrically connected to ones of said second plurality of contact elements,

wherein application of a pressure to said second surface of said contactor ~~effects~~ brings about electrical connections between ones of said first plurality of terminals on said contactor and ones of a second plurality of terminals on said electronic device through ones of said first plurality and second plurality of contact elements.

Claim 37 (Previously presented): The test apparatus of claim 36, wherein each of said contact elements of at least one of said first plurality of contact elements and said second plurality of contact elements are lithographically formed.

Claim 38 (Previously presented): The test apparatus of claim 37, wherein each of said contact elements of said first plurality of contact elements and said second plurality of contact elements are lithographically formed.

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Claim 39 (Previously presented): The test apparatus of claim 36, wherein each of said contact elements of at least one of said first plurality of contact elements and said second plurality of contact elements comprise a cantilever beam.

Claim 40 (Previously presented): The test apparatus of claim 39, wherein each of said contact elements of said first plurality of contact elements and said second plurality of contact elements comprise a cantilever beam.

Claim 41 (Previously presented): The test apparatus of claim 75, wherein said first plurality of contact elements are disposed on said first side of said substrate at a first pitch, and said second plurality of contact elements are disposed on said second side of said substrate at a second pitch different than said first pitch.

Claim 42 (Previously presented): The test apparatus of claim 36, wherein said substrate is flexible.

Claim 43 (Previously presented): The test apparatus of claim 36, wherein said substrate comprises silicon.

Claim 44 (Previously presented): The test apparatus of claim 36 further comprising an electronic component disposed on said substrate.

Claim 45 (Previously presented): The test apparatus of claim 44, wherein said electronic component is disposed between ones of said contact elements.

Claim 46 (Previously presented): The test apparatus of claim 44 further comprising a plurality of said electronic components.

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Claim 47 (Previously presented): The test apparatus of claim 46, wherein at least one of said plurality of electronic components is disposed on said first side of said substrate between ones of said first plurality of contact elements, and at least another of said plurality of electronic components is disposed on said second side of said substrate between ones of said second plurality of contact elements.

Claim 48 (Previously presented): The test apparatus of claim 36, wherein said ones of said first plurality of contact elements are compressed against said ones of said first plurality of terminals.

Claim 49 (Previously presented): The test apparatus of claim 48 further comprising a stop structure for limiting compression of said first plurality of contact elements.

Claim 50 (Previously presented): The test apparatus of claim 36 further comprising a stop structure for limiting compression of said second plurality of contact elements

Claim 51 (Previously presented): The test apparatus of claim 36, wherein said contactor comprises an integrated circuit.

Claim 52 (Previously presented): The test apparatus of claim 51, wherein said contactor comprises a plurality of integrated circuits.

Claim 53 (Previously presented): The test apparatus of claim 51, wherein said first plurality of terminals are disposed on said integrated circuit.

Claim 54 (Previously presented): The test apparatus of claim 51, wherein said integrated circuit comprises circuitry for testing said electronic device.

Claim 55 (Previously presented): The test apparatus of claim 79, wherein said semiconductor device is an unsingulated wafer.

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Claim 56 (Currently amended): The test apparatus of claim 79, wherein said semiconductor device comprises a plurality of singulated ~~[[dice]]~~ dies.

Claim 57 (Previously presented): The test apparatus of claim 36, wherein said contactor comprises a plurality of tile substrates.

Claim 58 (Currently amended): A test apparatus for testing an electronic device, said test apparatus comprising:

a contactor comprising a first plurality of terminals;

an interposer comprising:

a substrate,

a first plurality of elongate, resilient contact elements extending from a first side of said substrate, and

a second plurality of contact elements corresponding to a second side of said substrate, ones of said first plurality of contact elements being electrically connected to ones of said second plurality of contact elements; and

means for ~~securing~~ attaching said interposer to said contactor such that at least one of said contactor or said interposer is moveable between a first position and a second position while said interposer is ~~secured~~ attached to said contactor,

wherein in said first position, said first plurality of contact elements do not contact said first terminals on said contactor, and

in said second position, said first plurality of contact elements contact said first terminals on said contactor and said first plurality of contact elements and said second plurality of contact elements provide electrical connections from said first terminals on said contactor to a second plurality of terminals on said electronic device.

Claim 59 (Canceled)

Claim 60 (Previously presented): The test apparatus of claim 58, wherein each of said contact elements of at least one of said first plurality of contact elements and said second plurality of contact elements are lithographically formed.

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Claim 61 (Previously presented): The test apparatus of claim 58, wherein each of said contact elements of at least one of said first plurality of contact elements and said second plurality of contact elements comprise a cantilever beam.

Claim 62 (Previously presented): The test apparatus of claim 76, wherein said first plurality of contact elements are disposed on said first side of said substrate at a first pitch, and said second plurality of contact elements are disposed on said second side of said substrate at a second pitch different than said first pitch.

Claim 63 (Previously presented): The test apparatus of claim 58, wherein said substrate is flexible.

Claim 64 (Previously presented): The test apparatus of claim 58, wherein said substrate comprises silicon.

Claim 65 (Previously presented): The test apparatus of claim 58 further comprising an electronic component disposed on said substrate.

Claim 66 (Previously presented): The test apparatus of claim 65, wherein said electronic component is disposed between ones of said contact elements.

Claim 67 (Previously presented): The test apparatus of claim 65 further comprising a plurality of said electronic components.

Claim 68 (Previously presented): The test apparatus of claim 67, wherein at least one of said plurality of electronic components is disposed on said first side of said substrate between ones of said first plurality of contact elements, and at least another of said plurality of electronic components is disposed on said second side of said substrate between ones of said second plurality of contact elements.

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Claim 69 (Previously presented): The test apparatus of claim 58, wherein said first plurality of contact elements are compressed while said ones of said second plurality of terminals on said electronic device are pressed against said ones of said second plurality of contact elements.

Claim 70 (Previously presented): The test apparatus of claim 69 further comprising a stop structure for limiting compression of said first plurality of contact elements.

Claim 71 (Previously presented): The test apparatus of claim 58, wherein said contactor comprises an integrated circuit.

Claim 72 (Previously presented): The test apparatus of claim 71, wherein said contactor comprises a plurality of integrated circuits.

Claim 73 (Previously presented): The test apparatus of claim 71, wherein said first plurality of terminals are disposed on said integrated circuit.

Claim 74 (Previously presented): The test apparatus of claim 71, wherein said integrated circuit comprises circuitry for testing said electronic device.

Claim 75 (Previously presented): The apparatus of claim 36, wherein said first plurality of elongate, resilient contact elements is disposed on said first side of said substrate, and said second plurality of elongate, resilient contact elements is disposed on said second side of said substrate.

Claim 76 (Previously presented): The apparatus of claim 58, wherein said first plurality of elongate, resilient contact elements is disposed on said first side of said substrate, and said second plurality of contact elements is disposed on said second side of said substrate.

Claim 77 (Previously presented): The apparatus of claim 58, wherein said contactor further comprises an interface to a host controller.

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Claim 78 (Previously presented): The apparatus of claim 83, wherein said base is further configured to move said electronic device such that said ones of said second plurality of terminals on said electronic device are moved out of contact with said ones of said second plurality of contact elements.

Claim 79 (Previously presented): The test apparatus of claim 36, wherein said electronic device comprises a semiconductor device.

Claim 80 (Currently amended): The test apparatus of claim 79, wherein said electronic device comprises a semiconductor wafer comprising a plurality of unsingulated [[dice]] dies.

Claim 81 (Previously presented): The apparatus of claim 58, wherein said electronic device comprises a semiconductor device.

Claim 82 (Previously presented): The apparatus of claim 36 further comprising a base for supporting said electronic device.

Claim 83 (Previously presented): The apparatus of claim 58 further comprising a base for supporting said electronic device.

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Claim 84 (Currently amended): A test apparatus comprising:

a first substrate;

an interposer substrate;

a first plurality of elongate, resilient contact elements extending from a first surface of said interposer substrate and disposed to contact said first substrate;

a second plurality of elongate, resilient contact elements extending from a second surface of said interposer substrate, wherein said second surface is opposite said first surface and said second plurality of elongate, resilient contact elements are disposed in a pattern that corresponds to a pattern of contact points on an electronic device to be tested,

wherein application of a pressure directly to said first substrate causes ones of said second plurality of elongate, resilient contact elements to contact corresponding ones of said contact points on said electronic device to be tested.

Claim 85 (Previously presented): The test apparatus of claim 84, wherein said electronic device is a semiconductor device.

Claim 86 (Previously presented): The test apparatus of claim 85, wherein said semiconductor device is an unsingulated semiconductor wafer comprising a plurality of dies.

Claim 87 (Previously presented): The test apparatus of claim 84, wherein said first plurality of elongate, resilient contact elements are electrically conductive springs.

Claim 88 (Previously presented): The test apparatus of claim 87, wherein said second plurality of elongate, resilient contact elements are electrically conductive springs.

Claim 89 (Previously presented): The test apparatus of claim 84 further comprising a base for supporting said electronic device.

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